



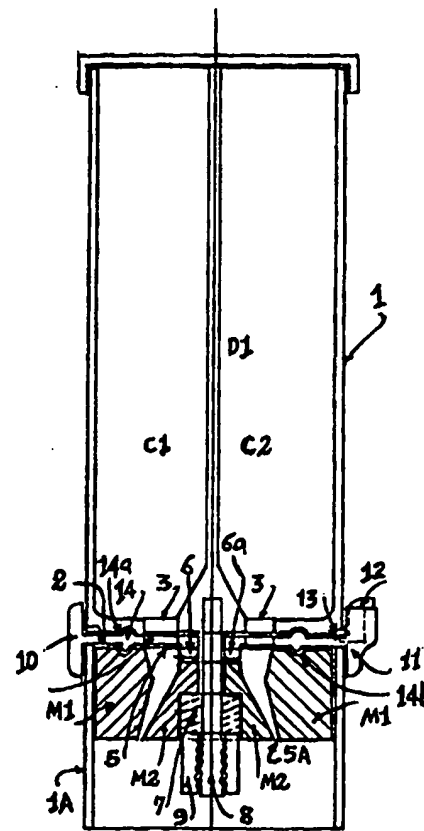
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/GB99/03808</p> <p>(22) International Filing Date: 15 November 1999 (15.11.99)</p> <p>(30) Priority Data:</p> <table border="0"> <tr> <td>9824946.9</td> <td>16 November 1998 (16.11.98)</td> <td>GB</td> </tr> <tr> <td>9909096.1</td> <td>22 April 1999 (22.04.99)</td> <td>GB</td> </tr> <tr> <td>9916720.7</td> <td>19 July 1999 (19.07.99)</td> <td>GB</td> </tr> </table> <p>(71)(72) Applicant and Inventor: MENELAOU, Xanthos [GB/GB]; 115 Sydney Road, London N10 2ND (GB).</p> <p>(74) Agent: MENELAOU, Xanthos; 115 Sydney Road, London N10 2ND (GB).</p>	9824946.9	16 November 1998 (16.11.98)	GB	9909096.1	22 April 1999 (22.04.99)	GB	9916720.7	19 July 1999 (19.07.99)	GB	<p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p><b>Published</b> <i>Without international search report and to be republished upon receipt of that report.</i></p>
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(54) Title: MULTI-COMPARTMENT MILL

## (57) Abstract

A Compartmented Mill comprising: a compartmented material housing body (1), a thin revolving plane (10), placed between the material housing body (1) and grinding mechanism M1 & M2, each compartment having material outlets (3), a material outlet (4), on the revolving plane (10) can align with the outlet of any particular compartment, and the predetermined size of hole outlets on both elements determine the rate of flow of material within the feeding holes of the grinding mechanism, eliminating storage of residue from one material when switching to the grating of another, and this is further achieved by lowering one part of the mechanism in relation to the other, thus widening outlet to the ambient, by spring action while revolving plane is switching from one material to another, thus disposing of any residue in the grinder.



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## MULTI - COMPARTMENT MILL

THIS INVENTION relates to a multi-compartment mill and more particularly to the aspects of solving the problem of clearing one material and its residue from the grinding mechanism, before switching to the grinding of another material.

The aim of multi-compartment mills is to bring convenience and economy to the user, nevertheless although several designs have been proposed in the past they have been complex in concept, expensive to manufacture and sell and non practical in use. More importantly none has solved the problem of residue remains in the mechanism from one material when switching to the grinding of another, and in particular in the case where one single grinding mechanism is used to grind more than one material. It is the object of the present invention to provide a solution to this problem by means of an economical to manufacture and sell multi-compartment mill, as well as practical to use.

Accordingly one aspect of the present invention is to regulate the flow of the material into the mechanism for grinding, to the rate of grinding and disposing the material to the ambient, so as to eliminate the problem of storage of non-grinded material of one kind into the mechanism, when switching to the grinding of another kind of material. Furthermore, in disposing completely remains of residue within the mechanism, one part of such a mechanism is lowered by means of spring pressure in the process of switching from one material to another, thus widening the opening of the mechanism to the ambient

releasing any residue remains within it, before switching to the grinding of another kind of material.

It may be that some users may not wish more than one material to be grinded by the same mechanism, nevertheless the multi-compartment concept is a practical proposition for them. For this reason a multi-compartment mill is proposed here, where each compartment has its own grinding mechanism placed below each compartment. As in the case of the single mechanism concept, a number of such designs have been proposed, but failed to reach the markets due to the complexity of design, expense to manufacture and sell, as well as been non-practical to use.

Accordingly another aspect of the present invention is a multi-compartment mill with more than one grinding mechanisms, where each mechanism is driven by a single handle that engages or disengages the gears of one or another of the mechanisms in order to provide grinding rotation. Furthermore no extra components are used for providing gears, simply existing components of the mechanisms and casing to them are made to function as gears.

An aspect of the present invention is the way by which the flow of material into the grinding mechanism is regulated by providing precise size outlets to the material housing body so as to avoid the building up of non-grinded material around the mechanism. Alternatively this can also be controlled by providing drawers to be opened or closed by hand, below each compartment of the material housing body with feeding holes of precise dimensions.

In order that the present invention may be more precisely explained, embodiments of it will be described with reference to the accompanying drawings, in which:

FIGURE 1. is a vertical section through the entire multi-compartment mill showing the interrelationship of main components of the single mechanism type.

FIGURE 2. A horizontal section through the single mechanism unit, showing relationship of the two parts of the grinder and way it is attached to the casing and centre part to the axle, as well as the material feeding holes.

FIGURE 3. A horizontal section through a lower part of single mechanism.

FIGURE 4. Plan of revolving plane placed between underside of material housing unit and top of grinding mechanism showing material outlet holes.

FIGURE 5. Plan of the underside of the material housing body, showing groove which controls the extend that the revolving plane can travel.

FIGURE 6. Horizontal section through the material housing body showing compartments dividing wall and material outlet holes.

FIGURE 7. Vertical section through the entire multi-mechanism multi-compartment mill showing relationship of main components.

FIGURE 8. Horizontal section through the grinding mechanisms showing relationship of gears on outer part of mechanisms to the driving gearwheel in the inner face of casing.

FIGURE 9. Horizontal section through the material housing body of multi-mechanism unit showing partitioning of compartments and material outlet holes.

FIGURE 10. Horizontal section through a lower part of multi-mechanism unit showing relationship of mechanism gears to gearwheel on outer casing.

FIGURE 11. Underside plan of cover to the grinding mechanisms.

FIGURE 12. Vertical section through material housing body showing double body method of rotating compartments for aligning material outlet holes.

FIGURE 13. Horizontal section through double body material housing body showing partitions to compartments and material outlet holes.

FIGURE 14. Vertical section through material housing body showing drawers to material outlet holes.

FIGURE 15. Horizontal section through material housing body showing drawers to the material outlet holes of separate compartments.

Referring to Figure 1, a compartmented material body 1, with compartments C1&C2 divided by a partition D1, is attached in the centre on an axle 8, that connects to the central part of the grinding mechanism M2. Mechanism M2 is held into position by a threaded nut 9, screwed to the lower part of axle 8. A hollow to the underside of mechanism M2, houses a spring 7. Spring 7, assists to spring mechanism M2 into normal position, when this part of the mechanism M2, is lowered by pressure exerted by tongue 6, of revolving plane 10, when turned to relocate its material outlet holes 4, to those of another outlet hole 3, of the material housing body 1. In lowering the central part of the mechanism M2, widens the grinded material outlet of mechanism 5A, thus allowing any excess grinded material in the mechanism M1&M2 to be disposed to the ambient, before switching to the grinding of another kind of material. Once the holes 4, of the revolving plane 10, align with the outlet holes 3, of another compartment, C1 or C2, tongue 6, of rotating plane 10, locks into indent 6a, at the top of mechanism M2, by springing back to normal position by the pressure of spring 7.

Revolving plane 10, has a multi-purpose function, acting as a barrier to the flow of material from any of the material housing compartments C1 or C2 into the mechanism M1&M2, but on the other hand has material outlet holes 4, of precise dimensions, for regulating the flow of material from any of the material housing compartments, whose outlet holes 3, are aligned with holes 4, to allow flow of particular material into the grinding mechanism. Once the particular outlet hole 3, is aligned with the outlet holes 4, of revolving plane 10, the revolving plane 10, locks into position by means of a locking mechanism 11, regulated by a spring handle 12, allowing a tongue 13, to lock into

an appropriate groove in the body of the material housing body 1. As such it restricts rotation of plane 10, in relation to the frame 1A of mechanism M1.

Figure 2, in conjunction with Figures 3, show the functioning of grinding mechanism M1&M2, the outer part M1 attached to casing 1A, and part M2 to axle 8, held non-rotatably to position by nut 9, and spring 7. When casing 1A, rotates relative to body 1, thus grinding the material against non-rotating part M2. Size and number of material feeding holes 5, is determined by required flow rate of material into the grinding mechanism. Recess 6a, receives tongue 6, when revolving frame 10, is locked into position.

Figure 4, is a plan of rotating plane 10, showing a number of material outlet holes 4, that regulate the flow of such material from a particular compartment of housing body 1. Also guiding rail 14, that runs into groove 14a, Figure 5, regulating the extend that the rotating plane can travel within groove 14a, thus aligning the material feeding holes of the material housing body 1, with those of the rotating plane 10. 10a acts as a handle to the revolving plane 10.

Figure 6, shows material housing body 1, compartments C1&C2, divided by partition D1, and material outlet holes 3, whose size is determined by amount of material required to flow into grinding mechanism M1&M2, in any particular unit.

Figure 7, discloses another embodiment of the present invention. In this embodiment twin grinding mechanisms M3&M4 are used, placing one under each compartment C3&C4. Each grinding mechanism is put into

action alternatively or as is required, by moving casing frame 22, up or down thus the gearwheel 23, inside the casing frame 22, engages the gearwheels 24 at the upper part of grinding mechanism M3, and by sliding down casing 22, it engages the gearwheels of grinding mechanism M4, at the lower part 24a. As in previous example, the centre part of grinding mechanisms M3&M4 are non-rotatably held into position by axles 26, where part 21, rotates by gear action. The material housing body 20, is divided into compartments C3&C4, by partition D2, and Figure 9, shows also material outlets around axle housing parts. Figure 11, is a plan of cover 27, to grinding mechanisms M3&M4.

Alternative ways of aligning material hole outlets of material housing body so that flow of such materials flows in a regulated manner into the grinding mechanism, is shown in Figures 12,13,14 &15, where Figure 12 shows a material housing body 31, within an outer body 30. By revolving body 31, holes 5a of compartments C5,C6&C7, align with outlet holes 5b of outer casing 30. Alternatively, Figures 14&15, show drawers 41, to each hole 42, that can be closed or opened to allow flow of material into the grinding mechanism as required.

**CLAIMS:**

1. A Compartmented Mill, each compartment of the material housing body housing one kind of material to be grinded individually, and having at its bottom part hole outlets, a thin pivoted plane is sandwiched between the said housing body and grinding mechanism with a single hole outlet, when said revolving plane turns by hand action around a central axle to align its hole outlet with that of the particular food housing compartment, the predetermined size of aligned holes on both bodies, control the amount and rate of flow of material into scooping holes of predetermined size at the top of the grinding mechanism, thus regulating flow of material into the grinding mechanism, with grinding and disposing rate of grinded material, eliminating storing of excess non-grinded material inside grinding mechanism when switching to the grinding of another kind of material, and the entire residue of said material from the grinding mechanism, is further completed in the process of turning the pivoted plane to align its outlet hole with that of another compartment, thus the tongue of revolving plane at one end presses upon the central part of grinding mechanism lowering the position of said mechanism in relation to its outer part, thus widening the outlet of the grinded material to the ambient allowing any residue in the mechanism to fall out before the said revolving plane aligns with the material outlet of another compartment, where the said central part of the mechanism returns to regular position by spring action.
2. A Compartmented Mill as in Claim 1, having a pivoted thin plane around a central axle and sandwiched between bottom part of material

housing body and upper part of grinding mechanism, outer periphery of said revolving plane acting as handle, where on the said periphery a locking mechanism is located, the said locking mechanism locks into place said revolving plane once said revolving plane material outlets align with those of particular material housing bod, and said plane guided into position by projecting point running into guiding channel on the underside of material housing body, determining the extend that the said plane can travel.

3. A Compartmented Mill as in Claim 1&2, having a grinding mechanism that receives through scooping holes of predetermined size a predetermined volume of material to be grinded, and its grinding capacity been such, that the storage of non-grinded material around or inside the mechanism is eliminated.

4. A Compartmented Mill as in all preceding where the central part of the grinding mechanism is mounted non-rotatably on a central axle attached to the material housing body, and at the bottom end is fixed removably to position by a threaded nut screwed to the central axle, sandwiching a spring housed within the cavity in the central part of grinding mechanism, and when said mechanism is pushed downwards by the said revolving plane, it returns to normal position once pressure by the said revolving plane seizes, due to spring action.

5. A Compartmented Mill utilising separate grinding mechanisms placed below each individual material housing compartment, each mechanism having part of its outer surface turned into gearwheel at different

position, a revolving casing is placed around the said mechanisms, having a gearwheel in its inside side, the said casing been able to slide up or down and in aligning the casing gearwheel with one of any of the gearwheels of the respective mechanisms, grinding rotation of of the alternative mechanisms is initiated.

6. A Compartmented Mill as in Claims 1 to 4, having a double skin material housing body, the inside body been divided to material compartments and capable of rotating within the outside casing, thus aligning the material outlet of the particular compartment to the material outlet at the bottom of the outer casing, where it locks into position, thus feeding the grinding mechanism with material at a predetermined rate.

7. A Compartmented Mill as in Claims 1 to 4, having a compartmented material housing body, each having its own material outlet, and the flow of material from any compartment into the grinding mechanism is controlled by drawers at the bottom of each material outlet.



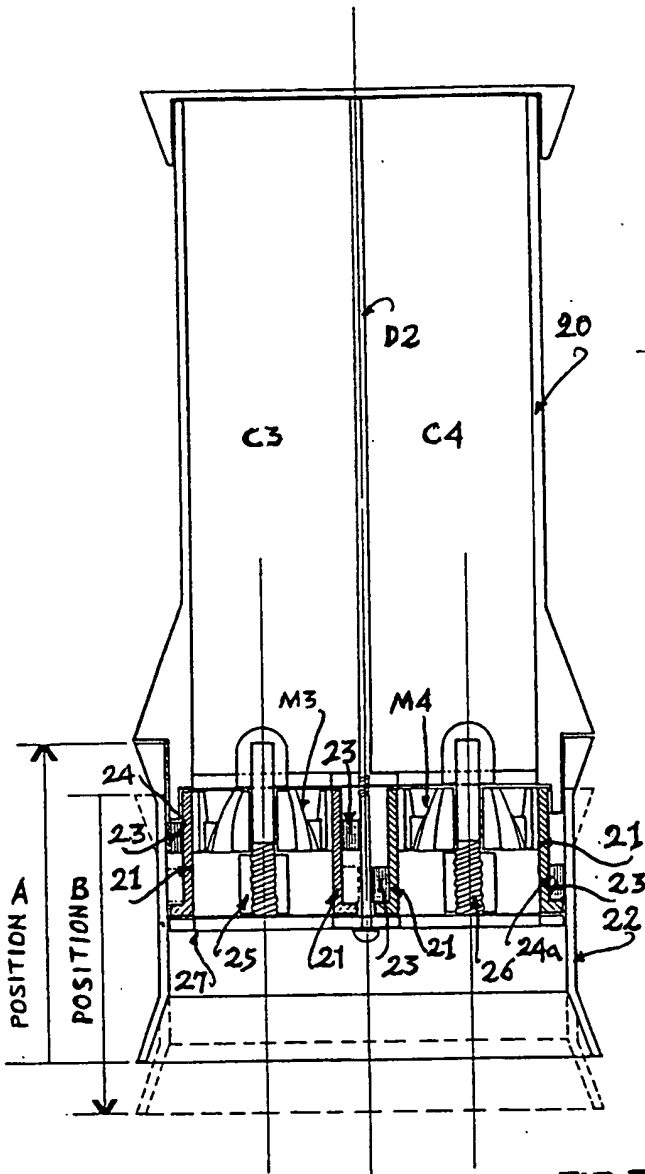


FIG. 7

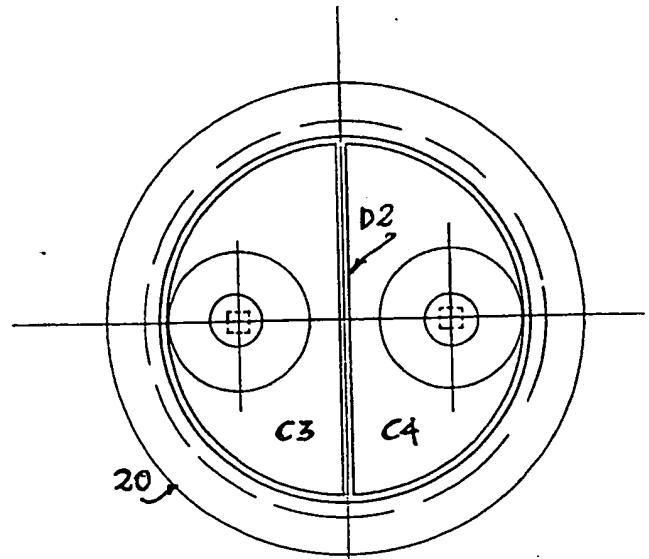


FIG. 9.

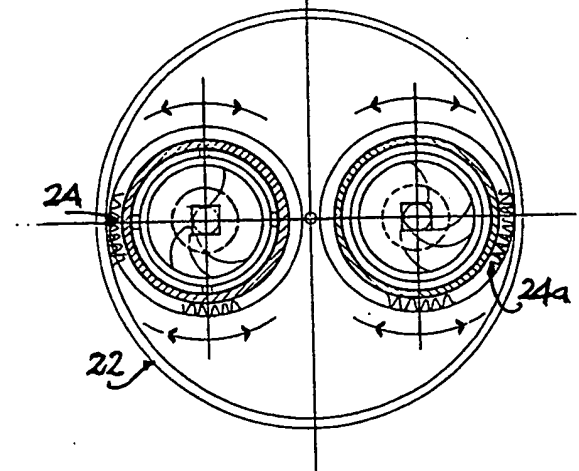


FIG. 8.

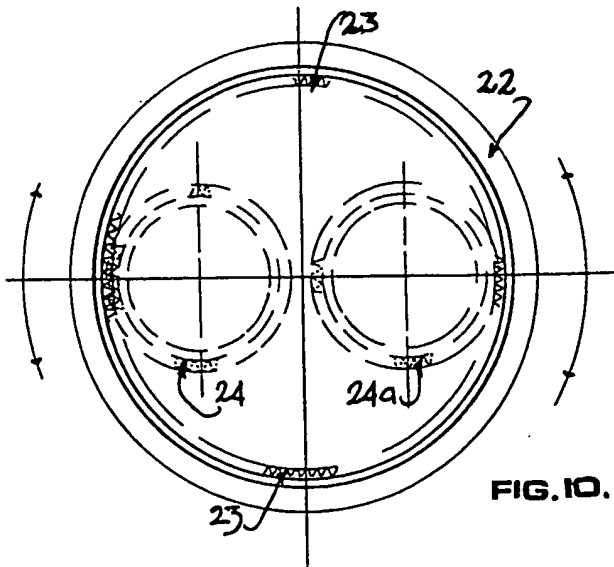


FIG. 10.

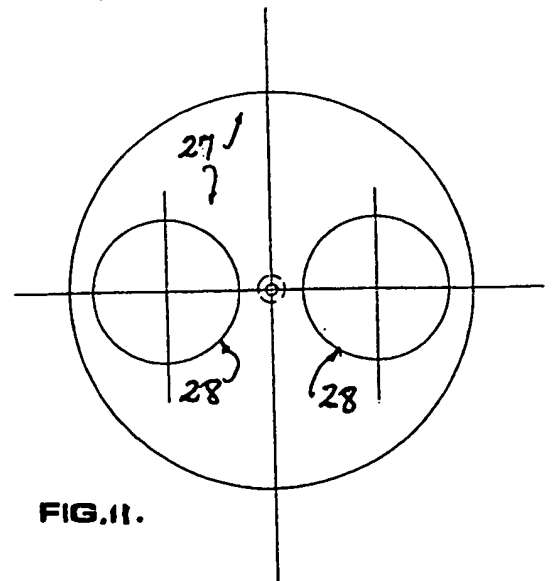
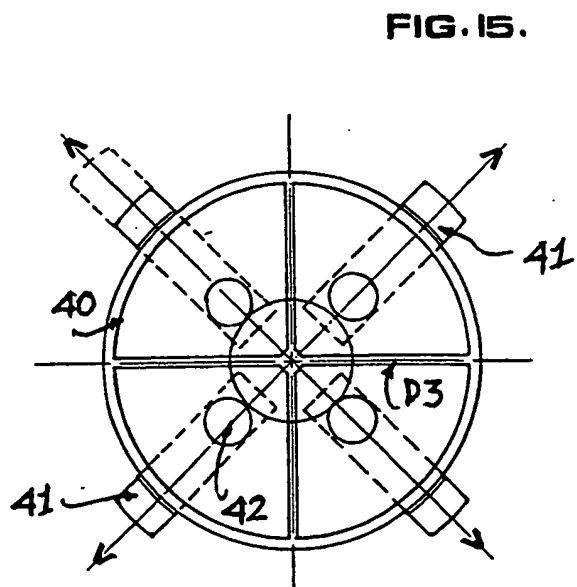
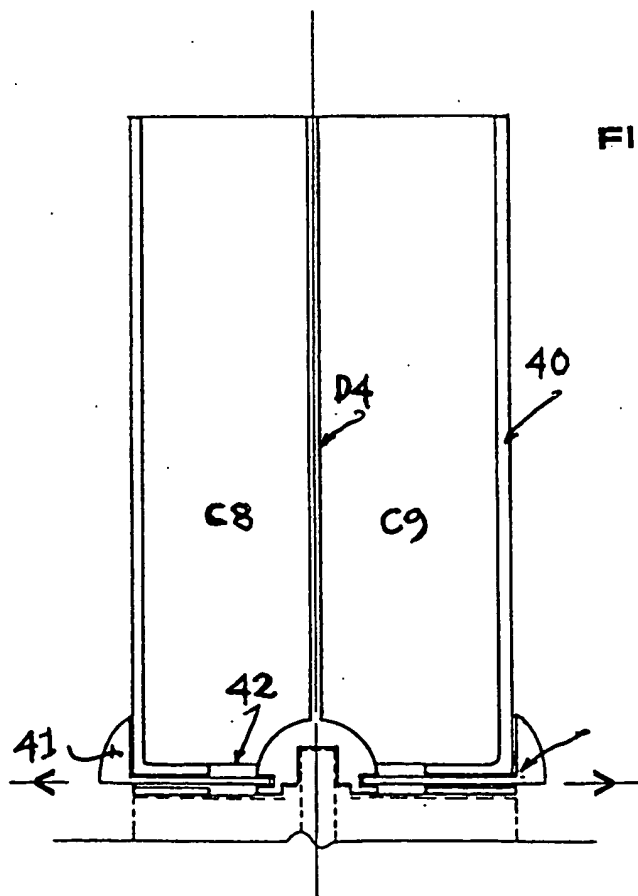
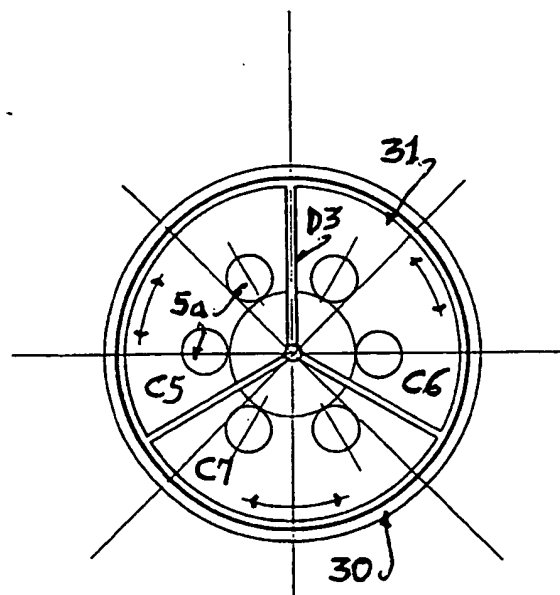
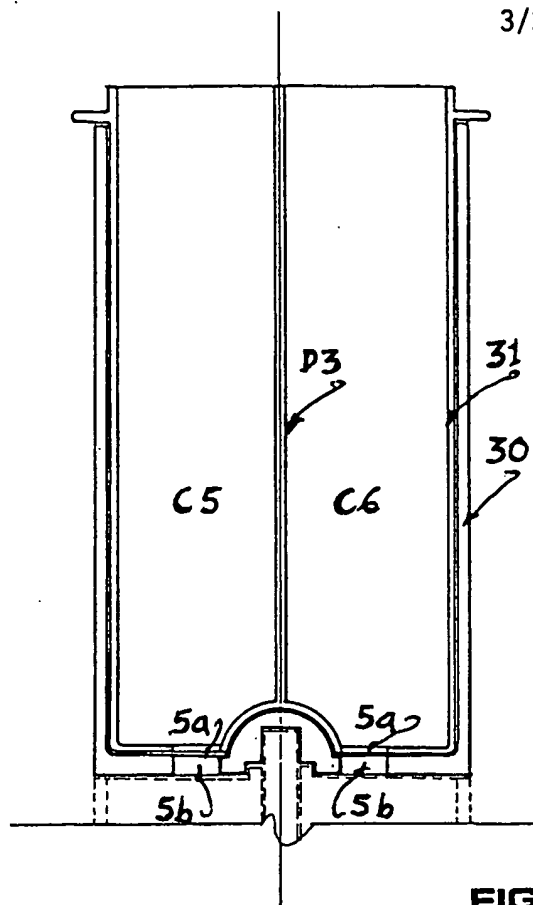


FIG. 11.

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